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(56) Documents cited
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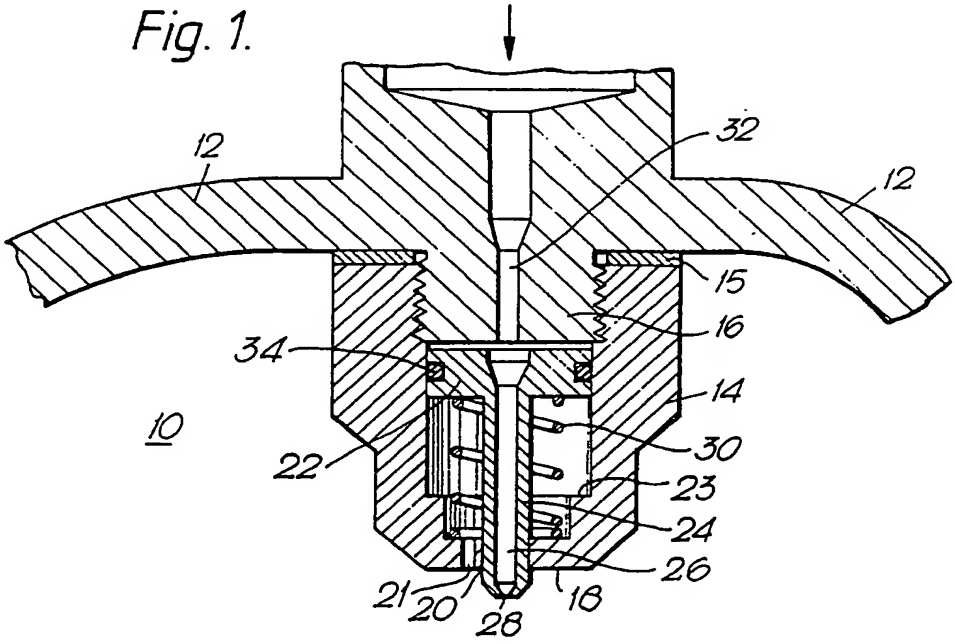
(54) Automatic retractable fluid delivery valve

(57) A fluid delivery valve comprises a hollow needle attached to a spring-loaded piston slidable in a cylinder. The needle at one end extends through an aperture in the bottom of the cylinder and at the other end through an axial aperture in the piston. The spring-loading is such as to urge the piston towards the top of the cylinder. Oil is fed under pressure through an inlet orifice in the top end of the cylinder into the cylinder and forces the piston down against the spring-loading and the needle through the aperture in the bottom of the cylinder, simultaneously forcing oil through the bore in the needle. On cessation of the oil supply, the spring forces the piston up, retracts the needle. The inlet orifice may offset from the bore in the needle so that the orifice is closed off by the piston when the needle retracts.

Fig. 1.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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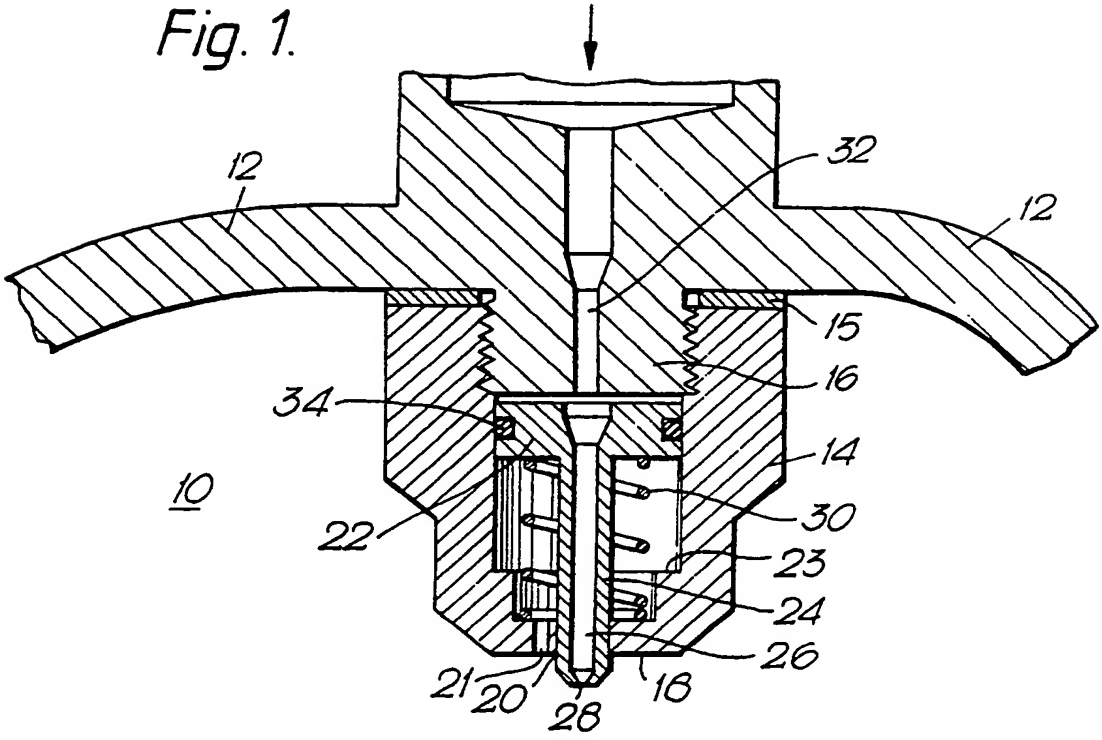
Fig. 1.



AUTOMATIC RETRACTABLE FLUID DELIVERY VALVE

This invention relates to a fluid delivery valve which automatically retracts the valve when the pressure of the fluid drops below a preset level.

It is common practice in the operation of heavy machinery, especially engines, to pump lubricating oil under pressure into a bearing chamber. Typically, the oil entering the bearing chamber will have been cooled and filtered in another part of the lubrication circuit. The practice therefore enables bearing surfaces under heavy load to receive an adequate supply of cooled, filtered oil.

It is required in some applications to direct the oil towards a specific region or part to be lubricated. This is done by directing the oil in the form of a jet from a hollow elongate member, such as a needle, projecting into the chamber. However, the use of a member projecting into a bearing chamber can cause a problem in assembly of the bearing chamber.

It is an object of the present invention to overcome the above problem.

According to the present invention there is provided a fluid delivery valve comprising, a cylinder having first and second end walls, an outlet aperture in the first end wall, a piston slidable within the cylinder, the piston having attached to its underside a needle extending through the outlet aperture, the needle having an axial bore extending from the upper surface of the piston to the distal end of the needle, a spring loading means located within the cylinder between the underside

of the piston and the first end wall, and adapted to urge the piston away from the first end wall, and an inlet aperture in the cylinder at the end opposed to the first end wall.

The invention will now be described by way of example only with reference to the accompanying schematic figure 1 which is a longitudinal section through a fluid delivery valve according to the invention.

Referring to the drawing there is shown a portion of a bearing chamber or enclosure 10 which is enclosed within a casing 12, only part of which is shown. Fixed to the inside of the casing 12 is a cylinder 14, being part of a delivery valve according to the invention. A portion of the casing 12 is threaded and provides a top end wall 16 onto which the cylinder 14 is screwed. An annular seal 15 is provided between the cylinder 14 and the casing 12. The other end of the cylinder 14 is provided with a bottom end wall 18 in the centre of which is provided an outlet aperture 20 and a vent aperture 21. An annular stop face 23 is provided within the cylinder near the bottom end wall 18.

Slidably located within the cylinder 14 is a piston 22 having attached to its underside a hollow axial needle or shaft 24 which extends through the outlet aperture 20 in a sliding relationship therewith.

The hollow needle 24 has an axial bore 26 extending from the top face of the piston 22 to the distal end of the shaft, thereby providing communication between the bearing chamber 10 and the cylinder space above the piston. The end of the bore 26 distal to the piston has a constriction 28 providing an exit jet.

A coil spring 30 extends between the underside of the piston 22 and end wall 18 or floor of the cylinder 14 so as to urge the piston away from the floor towards the top end wall 16.

The top end wall 16 of the cylinder 14 is provided with an inlet aperture 32.

The piston 22 is provided with a ring seal 34 located in a circumferential groove in its side wall.

In operation, oil or other fluid is fed under pressure through inlet aperture 32 into the cylinder space above the piston 22. The pressure of the oil forces the piston 22 downwards against the resistance of the coil spring 30 so as to bottom against the stop face, thus causing the piston shaft 24 to be pushed out through the outlet aperture 20 into the bearing chamber 10, whilst oil is forced through the needle to be ejected into the chamber. Air pressure within the cylinder between the piston and the bottom end wall is vented through vent aperture 21.

On shut-down, the oil pressure drops from its high dynamic level to a relatively low static level thus permitting the coil spring 30 to push the piston 22 upwards against the top end wall 16 of the cylinder 14 and thereby retract the needle 24 to within the cylinder.

The retraction of the hollow needle 24 into the bore of the cylinder 14 thus enables maintenance or disassembly of the bearing chamber 10 to be carried out without interference from a projecting needle jet.

In an alternative embodiment, not illustrated, the inlet aperture 32 is non-aligned with, and does not overlap, the needle bore 26 in the top face of the piston 22. In operation, when the needle 24 is retracted the piston 22 obturates the inlet aperture 22 and thus prevents drainage of oil from the lubrication circuit into the bearing chamber. This enables the circuit to be kept primed with oil and avoids problems with unprimed oil feed lines on the next start-up.

CLAIMS

1 A fluid delivery valve comprising, a cylinder having first and second end walls, an outlet aperture in the first end wall, a piston slidable within the cylinder, the piston having attached to its underside a needle extending through the outlet aperture, the needle having an axial bore extending from the upper surface of the piston to the distal end of the needle, a spring loading means located within the cylinder between the underside of the piston and the first end wall, and adapted to urge the piston away from the first end wall, and an inlet aperture in the cylinder at the end opposed to the first end wall.

2 A valve as claimed in claim 1 wherein the spring loading is provided by a coil spring.

3 A valve as claimed in claim 1 wherein the bore of the needle distal to the piston has a constriction providing an exit jet.

4 A valve as claimed in claim 1 wherein the cylinder is located inside an enclosure, the second end wall being provided by a wall of the enclosure.

5 A valve as claimed in claim 4 wherein the enclosure is a bearing chamber and the fluid is a lubricant.

6 A valve as claimed in any preceding claim wherein the inlet aperture is non-aligned with the axial bore of the needle such that the inlet aperture is obturated by the piston when the piston is urged away from the first end wall.

7 A fluid delivery valve substantially as herein described with reference to the accompanying drawing.

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